

# Environmental Restoration

## Overview

For more than 40 years, the primary mission of the U.S. Department of Energy, Nevada Operations Office (DOE/NV) was to conduct testing of nuclear and conventional explosives in conjunction with the research and development of nuclear weapons. Much of this field-testing was done at the Nevada Test Site (NTS), a 1,350 square mile



*The Nevada Test Site*

area, which is larger than the State of Rhode Island and is one of the largest secured areas in the United States.

The Environmental Management (EM) Program was established in 1989 at DOE offices around the country to address the environmental liabilities associated with more than 50 years of nuclear weapons production in the United States. The EM Environmental Restoration Program encompasses activities that assess the degree of contamination resulting from the testing program and performs actions required by federal and state regulations. DOE/NV environmental restoration activities fall under the purview of the DOE/NV Environmental Restoration Division.

The objectives of the DOE/NV Environmental Restoration Program are to: identify the nature and extent of the contamination; determine its potential risk to the public and the environment; and perform the necessary corrective actions in compliance with applicable regulatory guidelines and requirements.

The DOE/NV Environmental Restoration Program is responsible for corrective actions at approximately 800 former underground test sites, as well as more than 100 above ground test locations. In addition, other sites have been identified for potential corrective actions. These sites are located on the NTS, the Nellis Air Force Range, including the Tonopah Test Range, and at nine off-site test locations in five states, including Nevada. Among the many types of contaminants that require corrective action are radioactive materials, oils, solvents, gasoline, heavy metals (such as lead), and unexploded ordnance.

## Laws and Regulations

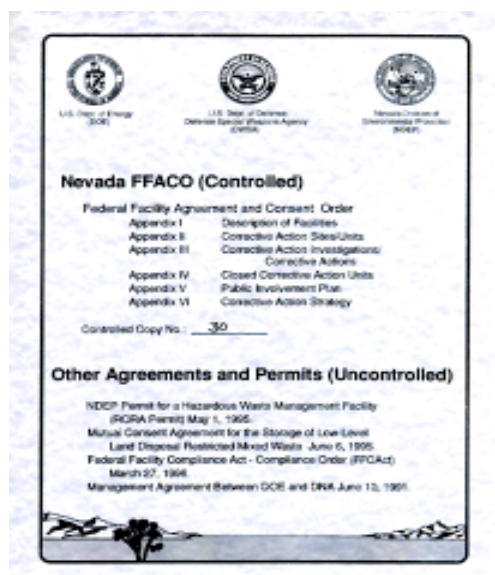
In conducting environmental restoration work, the DOE/NV must follow numerous laws and regulations created to reduce risk, control pollution, ensure the health and safety of workers and the public, protect the different ecosystems, and oversee land use.

- The ***Resource Conservation and Recovery Act (RCRA)*** is a comprehensive program for regulating and managing hazardous wastes, nonhazardous solid wastes, underground storage tanks, and promoting the use of recycled and recovered materials. The Act sets a federal policy of limiting land disposal of wastes in favor of other disposal methods. It also encourages solid waste management practices that promote environmentally sound disposal methods, maximize the reuse of recoverable resources, and foster resource conservation.
- The ***Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)***, as amended by the *Superfund Amendments and Reauthorizing Act*, provides for remediation of, and emergency response for, hazardous substances released into the environment and for remediation of hazardous waste sites that present a substantial danger to public health and welfare
- The ***Federal Facility Agreement and Consent Order (FFACO)*** is an agreement among the DOE/NV, the State of Nevada's Division of Environmental Protec-



tion, and the U.S. Department of Defense (DoD). It is the dominant regulatory driver for DOE environmental restoration activities in Nevada, covering all DOE administered sites within Nevada and DoD sites at the NTS. The FFACO establishes a framework for identifying, prioritizing, investigating, remediating, and monitoring the contaminated sites covered by the agreement. It also establishes a technical strategy for corrective actions, maximizes the opportunity to complete multiple corrective actions, and provides for public involvement activities.

- The **National Environmental Policy Act (NEPA)** requires federal agencies to fully consider and document all environmental consequences before beginning new programs or constructing new facilities. This law



applies to any activity that affects the environment and is funded or approved by a federal agency. The NEPA process makes information available to both federal offices and citizens before decisions are made.

## Environmental Restoration Processes

The processes that comprise environmental restoration activities are characterization, remediation, and deactivation and decommissioning.

Characterization and corrective action activities involve:

- Identifying and surveying the site, conducting preliminary assessment, and inspecting the site to determine the extent and nature of contamination
- Developing Corrective Action Investigation Plans that guide characterization activities
- Developing corrective action alternatives and selecting the preferred alternative
- Developing Correction Action Plans that identify how the selected corrective action will be performed
- Conducting the necessary activities to complete closure of the site
- Conducting monitoring to ensure the site is in compliance with closure requirements

Deactivation and decommissioning involves the safe dismantling and removal of inactive nuclear facilities, including hot cells, processing plants, and storage tanks. Several tasks are involved:

- Surveillance and maintenance to prevent human exposure to potential hazards
- Assessment of the type, extent, and nature of contamination
- Extensive review of regulations to assure compliance with environmental, health, and safety laws
- Development of an engineering design to reach facility end points
- Decontamination, dismantlement, or demolition of facilities
- Removal of wastes for storage or treatment
- Closure of facility

## Environmental Restoration Projects

DOE/NV environmental restoration activities have been divided into four projects: the Underground Test Area Project, the Industrial Sites Project, the Off-Sites Project, and the Soils Project. Within these projects, sites targeted for corrective actions are grouped according to location and characteristic into Corrective Action Units.

### Underground Test Area (UGTA) Project.

Within the UGTA project, scientists study the effects of underground nuclear detonations on the groundwater at





the NTS and surrounding areas. The UGTA investigation focuses on the geology and hydrology of the NTS to determine how contaminants are transported by groundwater flow. A regional three-dimensional computer groundwater model has been developed to identify any immediate risk and to provide a formulation for developing test-area specific models. The groundwater models of the individual test areas will be used to determine contaminant boundaries based on the maximum extent of contaminant migration. The results of the individual test area groundwater models will be used to refine a monitoring network. DOE maintains this groundwater monitoring network both on and off the NTS to ensure public health and safety. Groundwater monitoring is planned to continue in perpetuity.



*UGTA Project Well*

**Industrial Sites Project.** Industrial Sites are locations on the NTS and Tonopah Test Range, located on the Nellis Air Force Range, that supported historic nuclear testing activities. Sites that fall under this project include disposal wells, inactive tanks, contaminated waste sites, inactive ponds, muck piles, spill sites, drains and sumps, and ordnance sites. After undergoing characterization to determine the extent of contamination, if any, many of these sites may be closed in place. This means removal and disposal of debris such as old batteries and paint

containers. Other sites may involve a higher level of corrective action that is determined by the decision documentation, and may include excavation of the site and subsequent monitoring to ensure compliance with requirements in closure documentation.



*Industrial Sites project at the Nevada Test Site*

**Off-Sites Project.** In addition to locations at the NTS and Tonopah Test Range, the DOE/NV is responsible for the corrective action of nine sites in five states, including Nevada, where DOE conducted underground nuclear tests and experiments. The surface sites and facilities will be characterized, corrective actions performed, and the waste will either be closed in place, treated and disposed on site, or transported off site. The strategy will be to characterize groundwater flow and areas of contamination, assess risk, and model contaminant movement away from shot cavities. For the subsurface, monitoring will be done to ensure compliance with parameters identified in closure documentation. Subsurface monitoring will continue in perpetuity. The nine off-sites locations include:

- Project Chariot Site and Amchitka Island, Alaska
- Project Rulison (Grand Valley), and Rio Blanco Site (Rifle), Colorado
- Salmon Site (Hattiesburg), Mississippi
- Project Faultless (Central Nevada Test Area) and Project Shoal Area (Fallon), Nevada
- Gnome Site (Carlsbad) and Gasbuggy Sites (Farmington), New Mexico



**Soils Project.** The surface soils at various sites on the NTS and the Nellis Air Force Range, including the Tonopah Test Range, became contaminated with radioactivity from three types of tests conducted there. These tests include approximately 100 atmospheric weapons tests that involved nuclear reactions; a series of tests designed to determine the safety of devices by stimulating various accident situations; and a series of tests under the Plowshare Program, which related to peaceful uses of nuclear explosives. The surface soils were contaminated, to varying degrees, from the atmospheric nuclear tests, or by uranium and plutonium oxides from the safety and Plowshare Program tests.

Sites identified for corrective action under the Soils Project first undergo characterization. For soils sites outside or straddling NTS boundaries, contamination above the corrective action level will be excavated, the waste disposed, and monitoring performed in accordance



*Soil characterization*

with closure documentation. Sites on the NTS will be characterized, hot spots will be removed, and the sites monitored according to site monitoring plans.

## Public Participation

There are a number of ways for members of the public to get more information and/or become involved in environmental restoration work conducted by DOE/NV.

- Attend public meetings and outreach programs sponsored by DOE/NV
- Request a speaker from the DOE/NV Speakers Bureau to present information to a community, academic, civic, or professional group



*Community Advisory Board Meeting*

- Request to be added to the DOE/NV stakeholder mailing list to receive timely meeting notices and information on environmental restoration projects and activities
- Read other fact sheets and informational materials
- Become involved with the Community Advisory Board for the Nevada Test Site Programs
- Visit the DOE/NV website at: <http://www.nv.doe.gov>



For more information, please contact:  
 U.S. Department of Energy  
 Nevada Operations Office  
 Office of Public Affairs and Information  
 P.O. Box 98518  
 Las Vegas, NV 89193-8518  
 (702) 295-3521  
[nevada@nv.doe.gov](mailto:nevada@nv.doe.gov)  
<http://www.nv.doe.gov>



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